

XXII. *On the Impregnation of Dischidia.* By the late WILLIAM GRIFFITH, Esq.,
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THE following observations were made on the *Dischidia Rafflesiana*, Wall., about the 18th of January 1835. They were confirmed by subsequent re-examination about a week after that time, and, with the exception of the development of the ovula, by the examination of another species, apparently allied to *D. bengalensis*, on the 3rd of February 1835. I shall first run over the changes that occur in the ovula while passing from their infant to their perfect form.

At the earliest period the ovula are mere rounded elevations on the placenta, attached to this by broad bases (TAB. XVIII. fig. 1). The first change takes place when the corolla begins to exceed the calyx in length, and merely consists of a narrowing towards the base (TAB. XVIII. fig. 2). When the corolla is about twice as long as the calyx, this narrowed portion has put on the appearance of a funiculus. At the same time a rounded rather shallow cavity appears on the upper edge of the ovule and close to the funicle. Both diameters of this are nearly equal (TAB. XVIII. fig. 3). The changes now take place rapidly. When the corolla is two-thirds longer than the calyx, the ovula have assumed to a considerable degree their perfect form, differing chiefly in size. The rounded cavity has now assumed the appearance of a deep fissure, extending from the base of the ovule close to the umbilical cord, along the upper margin of the ovule for about one-fourth of its length. The margins of this fissure appear raised: its greatest diameter is longitudinal (TAB. XVIII. fig. 4). Up to this period there is no trace of a central excavation or cavity. When the corolla is half-developed the ovule retains the same form, but the fissure is longer and its lips more expanded. A small rather indistinct grumous-looking mass is now visible in the central line, but towards the apex of the ovule.

This is the first rudiment of the nucleus, or of the cavity within which the future embryo is to be developed (TAB. XVIII. fig. 5). Just before the expansion of the corolla this mass becomes distinct, and frequently assumes a rounded form. The globules I consider to be dislocated tissue. It consists of an aggregation of brownish globules and smaller granules, which in fact closely resemble the granules of the boyaux. The perfect ovule is compressed laterally: the umbilical cord is attached close to its base. The upper margin is convex; the lower or dorsal generally straight, and often more or less concave. The fissure is now very large, extending longitudinally from the base of the umbilical cord for about one-third of the length of the convex upper margin; its lips or edges are gaping; it is of considerable depth. It appears to narrow gradually towards its fundus. The grumous globular mass is now very distinct, and the first indications of an excavation around this mass are appreciable (TAB. XVIII. fig. 6). In flowers which have passed their meridian (no impregnation however having taken place) the excavation is enlarged: the grumous mass is now more irregular, and frequently appears to be broken up, the component parts being then irregularly grouped together:

In this genus the corolla is always closed to a considerable degree by the connivence of its divisions. In addition to this, the divisions of the corolla in *D. Rafflesiana* are furnished with short hairs, which project inwards. We may therefore subtract the aid of foreign agency in determining the escape of the pollinia from the anthers; and we may likewise state, that when impregnation takes place in a given flower, it is by the action of its *proper* pollinia.

The pollinia are erect, oblong, somewhat compressed; they have no diaphanous margin. The dehiscence takes place along the inner margin of each mass, that is, as regards the cell of the anther in which it was previously lodged. This corresponds with the margin of dehiscence of the pendulous pollinia, first noticed by Mr. Brown. This line presents no appreciable structural difference,—nothing to indicate why the boyaux pass out here in preference to any other point. The fissures of communication are open in *D. Rafflesiana*; in the other species their edges are closely approximated as far as their most prominent angles.

The base of the stigma is *stigmatic* (*i. e.* papillose) in both species; slightly so in *D. Rafflesiana*, considerably more so in the other species. The cellular

tissue of the apiculus in both contains opaque, round, minute bodies, of the nature of which I am ignorant. In neither of these species have I seen the pollinia engaged in the fissures of communication. In the cases I have examined, in which impregnation had taken place, the pollinia were either caught by the processes of the corona, or had fallen into the fundus of the corolla.

The cord formed by the aggregation of the boyaux, in whatever situation they may have been emitted, passes up towards the nearest fissure, in which it engages itself. Having become engaged, it becomes more opaque and grumous, and the boyaux are closely approximated. Its course is thence upwards to the base of the stigma (TAB. XVIII. fig. 9). Having reached this point, it is reflected along and in close apposition to the base of this body, until it reaches the union of the stigma with the styles: it then dips into the style or styles, generally however one, and, from the shortness of these, soon reaches the placenta, producing in its course slight discoloration of the adjoining tissue. On reaching the ovuliferous portion of the placenta, the boyaux separate and proceed in every direction among the ovula, to which they become firmly applied. These boyaux have the usual appearance and termination: they contain much granular matter and many coagula: the granular matter has a strong tendency to accumulate towards the termination of the boyaux, the upper part remaining quite empty: they are often exceedingly numerous about the part in application with the ovula: in others, again, scarcely any granules are visible. This does not appear to depend upon a greater degree of duration of such boyaux. The irregularity as to number seems to throw doubt upon their supposed nutrient functions. I have seen oscillatory motion of the *contained* granules, but no motion of ascent or descent. Coagula are likewise seen occasionally in the vicinity of the ovula. The tubes are simple, and one appears to be allotted to each ovule: they remain applied to the ovula for some time; they are distinctly visible when the ovarium has exceeded the calyx about one-third in length. Even at this time the granules are frequently crowded about their extremities. They invariably pass in at the centre of the fissure (TAB. XVIII. figs. 7, 8), and are so firmly applied that they break across sooner than separate from their attachment. The tissue of the ovula is so opaque and so delicate, that I have hitherto been unable to

demonstrate their terminations by actual dissection. In one case I have seen the boyaux terminate about the fundus of the groove or fissure in a cul de sac (TAB. XVIII. fig. 8), which was crowded with granules. They may frequently be traced, though indistinctly, towards the same point.

Whatever the functions of the granules may be, similar bodies exist in the cellular tissue of the ovula both before and after the application of the tubes: they are probably much larger than the real fecundating agents, as Mr. Brown supposes. The majority certainly disappear before the tubes reach the ovula.

With regard to the changes produced in the ovula after the application of the tubes, I may remark that there is no immediate effect produced. The cavity or nucleus I have already shown to pre-exist. Some time after the action of the tubes has commenced the excavation appears larger, and extends towards the point of insertion of the boyau. As this action is continued, the whole of the granular and globular mass disappears, and the chief part of the ovule is occupied by the now empty excavation (TAB. XVIII. fig. 7). No further appreciable changes other than in size take place for some time, and the rudiments of the coma are even visible before any part of the embryo appears to be formed.

I shall conclude with observing, that the emission of the boyaux without the engagement of the pollinia within the fissures of communication, and without any appreciable cause to produce such an effect, is very remarkable: still more so is their passage to, and engagement in, these fissures. The passage of the cord *upwards* to the base of the stigma, and its subsequent reflection along its surface to the apex of the style is still more striking. What is the use of the papillosity of the stigma? One would imagine, that as the cord does not enter at this point, it might as well have passed directly towards the apex of the styles. It shows distinctly that this portion of the stigma exerts a peculiar and essential influence over the boyaux.

The pre-existence of the nucleus or central excavation is contrary to what has been observed in *Asclepias* by Mr. Brown. There is the same correspondence between the attenuated extremity of this and the point of insertion of the boyau as in *Asclepias*.

EXPLANATION OF PLATE XVIII.

- Fig. 1. Ovules of *Dischidia Rafflesiana*, Wall., with a portion of the placenta, at an early stage, magnified.
- Fig. 2. The same, somewhat more advanced.
- Fig. 3. An ovule, taken when the corolla is twice as long as the calyx; the first appearance of the subsequent fissure, *a*, is now visible.
- Fig. 4. The same, taken when the corolla is three times as long as the calyx; *a*, the more developed fissure.
- Fig. 5. The same, taken when the corolla is half-developed; *a*, the fissure, is now of considerable size; *b*, the grumous indication of a nucleus.
- Fig. 6. A perfect ovule, before the application of the pollen-tube.
- Fig. 7. An ovule, to which the pollen-tube has been attached for some time. The central excavation is now very distinct, and the grumous globular mass has disappeared.
- Fig. 8. An ovule, with its boyau, showing the termination of the boyau within the fissure.
- Fig. 9. A longitudinal section of the *corona staminea* and sexual organs of the same species, the floral envelopes being removed, with the exception of their bases, to show the course of the cord from the *pollinia* to the *placentæ*.

